of direction provided by the inventor; (G) The existence of working examples; and (H) the quantity of experimentation needed to make or use the invention based on the content of the disclosure. Each of these are addressed below:

(A) The breadth of the claims. The elements present in the coating are defined by definitions (1)-(5). Each definition is a combination of four elements (O, C, H, and N) and a metal. The metal is further limited by its selection from the group consisting of silicon, titanium, tantalum, germanium, boron, zirconium, aluminum, hafnium, and yttrium. Accordingly, the claimed invention does not encompass an infinite number of combinations and the claims are not exceedingly broad in scope. The disclosure includes examples of precursor materals that can be used to deposit the claimed combinations, and thus, the disclosure is commensurate with the scope of the claims. See Specification, page 7, lines 3-10. Hence, it is submitted that this factor weighs in favor of the Applicants in this case.

Moreover, the Action states that the combinations of coatings would include a natural coating such as charcoal with reference to definition (3). Applicants submit that charcoal is not an amorphous chemically crosslinked material. An example of an amorphous chemically crosslinked carbon coating is a diamond-like carbon coating, which has both graphitic and diamond like characteristics.

(B) The nature of the invention. The present claims are combination claims directed to a substrate with an amorphous chemically crosslinked coating. Combination claims have by long established practice been accorded broad scope of enablement. Hence, it is submitted that this factor weighs in favor of the Applicants.

(C) The state of the prior art. The art of substrate coating techniques, including plasma enhanced chemical vapor deposition, sputtering, evaporation, plain, dip-, flow- or spin coating, is well developed and provides a vast body of resources to which skilled persons can refer as an aid to practicing the present invention. Hence it is submitted that this factor weighs in favor of the Applicants.

(D) The level of one of ordinary skill. The level of ordinary skill in this art is high, and would encompass at least a Ph.D. coupled with post-doctoral or industry experience. Since persons seeking to practice this invention possess great expertise, it is submitted that this factor weighs in favor of the Applicants as well.

(E) The level of predictability in the art. This art is predictable. Unlike certain fields of biotechnology and pharmaceutical arts, which are generally considered

highly unpredictable, the various techniques for making the claimed coated substrate are well-known and understood. Moreover, as established by the MPEP and the *Wands* factors, this is not the sole or even the dispository inquiry in determining enablement. Hence, this factor weighs in favor of the Applicants.

(F) The amount of direction provided by the inventor. Considerable direction is given throughout the specification. Details are given regarding various coating techniques, exemplary precursors, temperature and pressure ranges and the like.

(G) The existence of working examples. A working example including a $Si(CH_3)_4$ precursor is provided. Additional examples of other precursors that can be used are also provided. It is also emphasized that, even in unpredictable arts, working examples are not required to satisfy the enablement requirement. *In re Strahilevitz,* 668 F.2d 1229, 212 USPQ 561 (CCPA 1982).

(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure. Various techniques for making the claimed coated stubstrate are well-known. The precursor compounds provided by the disclosure are readily available. Accordingly, it is respectfully submitted that experimentation required to determine how to practice the instant invention would be routine to persons skilled in this art.

For the foregoing reasons, it is respectfully submitted that the instant claims satisfy the requirements of 35 USC 112, first paragraph, and respectfully submitted that this rejection should be withdrawn.

Prior Art Rejections

The present invention relates to a coating including a chemically crosslinked coating material that is terminated with at least one electrophilic or nucleophilic group for the adsorption and non-adsorption of biomolecules as recited in the claims. Applicants submit that none of the cited references teach or suggest, alone or in combination, the claimed coating that is terminated with an electrophilic or nucleophilic group for the adsorption and non-adsorption of biomolecules.

According to embodiments of the present invention, an electrophilic functional group is one with an electropositive polarity, and a nucleophilic functional group is a group capable of donating a pair of electrons to an electrophile. See Specification, page 4 lines 24-26; page 5, lines 16-18. It is believed that the nucleophilic or

electrophilic functional groups promote adsorption or nonadsorption. For example, if a surface with a positive polarity from a nucleophilic functional group is exposed to a negatively charged molecule, the surface may attract and adsorb the molecule. See page 5, lines 7-9.

Rejections under § 102(b)

Claims 1-5, 8-9, 11-14, 44-45, 47-50, and 53-54 stand rejected as being anticipated by Hu. Hu proposes a method of coating a substrate to produce abrasion resistant surfaces. According to Hu, the coatings may be deposited on various substrates, such as optical lens, plumbing fixtures, vanes used in aircraft engines, optical memory discs, tapes and cards, glazing, camcorder and camera casings, airplane windows, solar panels, LCD windows, and fibers. Hu, col. 8, lines 1-7. The deposition method involves a plasma enhanced chemical vapor deposition (PECVD). Hu, col. 1, lines 44-55. Hu proposes that the coating can be post treated with an oxygen or organosilicone plasma to render the surface of the coating more hydrophilic or hydrophobic, respectively.

Hu is not concerned with electropositive or electronegative polarity as claimed by Applicants because the purpose of the coating method in Hu is to produce a hard, abrasion resistant surface. See col. 1, lines 33-45. Accordingly, Hu does not teach or suggest a chemically crosslinked coating material that is terminated with at least one electrophilic or nucleophilic group for the adsorption and non-adsorption of biomolecules as recited in the claims. Applicants submit that Claims 1-5, 8-9, 11-14, 44-45, 47-50, and 53-54 are not anticipated by Hu and request that the outstanding anticipation rejection be withdrawn.

Moreover, Claim 17 is independently patentable over Hu. Claim 17 recites that "the coating has a thickness between about 200 and about 400 nanometers." In contrast, the coatings discussed in Hu have abrasion resistant properties and, as a result, the coatings are described as being significantly thicker than about 200 to about 400 nanometers. Specifically, Hu discusses coating thicknesses between about 2 to about 8 microns. Hu, col. 7, lines 62-64.

Claims 1-20, 44-45, and 47-50 stand rejected as being anticipated by Cozzette. Cozzette discusses an adhesion promoter "by which the preselected ligand receptor may be immobilized." See Cozzette, col. 14, lines 1-3. A ligand is a molecule that

will bind to a complementary site. Citing Cozzette, col. 28, lines 50-62, the Written Opinion describes Cozzette as discussing a semipermeable solid film comprising a silane compound that includes a terminal amine group in which an enzyme can be attached. Cozette, col. 28, lines 53-55, specifically proposes that the attachment is a "covalent attachment of an enzyme to the substrate surface."

Cozzette does not teach or suggest a material that is terminated with at least one electrophilic or nucleophilic group for the adsorption or nonadsorption of biomolecules as claimed by Applicants. Adsorption is defined by McGraw-Hill's Dictionary of Scientific and Technical Terms, 3rd Ed. (1984) as "the surface retention of solid, liquid, or gas molecules, atoms, or ions by a solid or liquid, as opposed to absorption, the penetration of substances into the bulk of the solid or liquid." Adsorption and nonadsorption is an electrostatic phenomenon and does not involve a formation of chemical bonds. Definitions for nucleophilic and electrophilic functional groups are given in the Specification. See Specification, page 4, line 25-26. See page 5, line 18. Accordingly, Applicants submit that Claims 1-20, 44-45, and 47-50 are not anticipated by Cozzette and request that the outstanding anticipation rejection be withdrawn.

Rejections under § 103(a)

According to MPEP § 2143, to establish a prima facie case of obviousness, three basic criteria must be met: there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; there must be a reasonable expectation of success; and the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Claim 46 stands rejected as being unpatentable over Hu in view of Matsui. As discussed above, Hu does not teach or suggest a chemically crosslinked coating material that is terminated with at least one electrophilic or nucleophilic group for the adsorption and non-adsorption of biomolecules as recited in the claims. Moreover, Claim 46 is patentable because there is no motivation to combine Hu and Matsui.

With respect to Claim 46, the Action concedes that the coated substrate of Hu does not disclose the precursor of tetramethyl silane. The Action relies on Matsui for

its discussion of a tetramethyl silane gas used in forming an insulating thin film having good step coverage.

Matsui proposes a method to form a highly insulating thin film having good step coverage on a semiconductor substrate that has a trench. See col. 3, lines 32-35. Matsui discusses "good step coverage" in column 4, lines 48-57, reproduced below:

> Since the intermediate reaction product...hardly adheres to the vertical surfaces of the trench, it accumulates on the bottom of the trench. As a result, a thin film is formed on the surface of the substrate and in the trench, achieving good step coverage. The thin film, thus formed on the surface of the substrate, has a flat upper surface in spite of the trench made in the surface of the substrate.

The Action states that "[o]ne of ordinary skill in the art would have been motivated to include tetramethyl silane as a precursor in the coated substrate of Hu et al. for the advantage of forming a highly insulating thin film having good step coverage." The Action, page 9, lines 6-8. However, Hu is not concerned with the insulating properties or the "step coverage" of the coatings made by its proposed method. In contrast, the object of Hu is to form a hard, abrasion resistant coating that could be applied to optical lens, plumbing fixtures, vanes used in aircraft engines, optical memory discs, tapes and cards, glazing, camcorder and camera casings, airplane windows, solar panels, LCD windows, and fibers. See col. 8, lines 1-7.

Accordingly, there is no motivation to combine the cited references and Applicants respectfully request that the outstanding rejection of Claim 46 under § 103(a) be withdrawn.

Conclusion

In light of the above amendments and remarks, Applicants respectfully submit that the application is in condition for allowance and respectfully requests same. The Examiner is requested to contact the undersigned to resolve any remaining issues.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, DC 20231, on May 29, 2003

Carey Gregory
Date of Signature: May 29, 2003